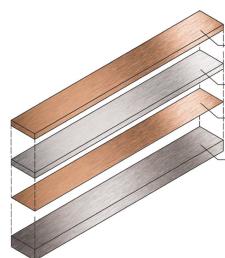


APPROACH I**Electrodeposition + annealing**

Electrodeposition of Cu/Sn/Cu multilayers from aqueous solutions onto Nb + Thermal treatment for Sn-Nb interdiffusion



3. Copper barrier
2. Sn
1. Copper strike
Nb substrate

Copper barrier

- ✓ Prevents Sn leakage during TT
- ✓ Compact structure of samples

Copper strike gives

- ✓ Lower Nb₃Sn formation T
- ✓ Higher grain boundary density
- ✓ Good adhesion
- ✓ Higher growth rate

APPROACH II**Direct electrodeposition**

Electrodeposition of Nb-Sn alloys onto Cu substrates

IONIC LIQUIDS

- **EMIM**: 1-Ethyl-3-methylimidazolium chloride
- **BMIM**: 1-Butyl-3-methylimidazolium chloride



High NbCl₅ solubility
Higher Nb content in the coating

Work Package 7 - Advanced superconducting techniques for particle accelerators

Objective O7.3: Optimize state-of-the-art electrochemical techniques for Nb₃Sn thin layer deposition on Nb and on Cu

State of the art at Polimi

I. 2012 Master thesis

Electrochemical synthesis of Nb-Sn coatings for High Field Accelerator Magnets (Federico Reginato)



US Patent "Synthesis of superconducting Nb-Sn" (Polimi, FermiLab)

II. 2014 Master thesis

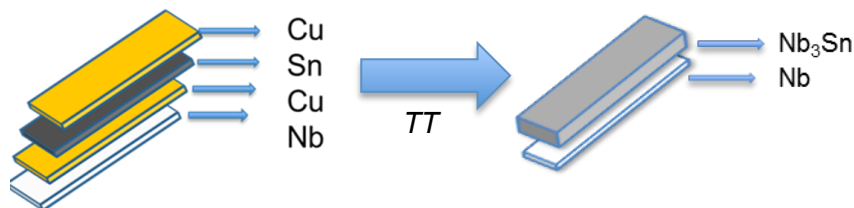
Electrochemical Synthesis of Nb-Sn Coatings from ionic liquids (Luigia Glionna)



Previous results were not reproduced

Activities mentioned in O7.3

1. Improve adhesion of the film
2. Optimize thermal treatments
3. Achieve the best uniformity of the deposit across both flat and curved surfaces
4. Increase purity



Activities planned (months 3-21)

- a. Update of state of the art on Nb-Sn coatings obtained by electrodeposition
- b. Reproduce previous results with respect to:
 - a. Optimization of etching procedure to achieve good adhesion to the Nb substrate
 - b. Avoid corrosion problems
 - c. Avoid undesired barrier diffusion layers during thermal treatment
 - d. Optimization of thermal treatment of Cu/Sn/Cu multilayers onto Nb substrate

35	ER	POLIMI	IT	16	1
35	ER	POLIMI	IT	40	1
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36	ER	POLIMI	IT	32	1
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